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Advances in High Strength–Ductility Synergy Materials

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Message from the Guest Editors

The trade-off between strength and ductility has been a long-standing challenge for high-performance materials. In recent years, microstructure design to control and engineer deformation mechanisms at the microscale has opened new pathways towards fabricating materials that exhibit synergy between strength and ductility. Moreover, high-entropy alloys have significantly extended the material design space so that new alloys with excellent mechanical properties can be produced. Materials with high strength and high ductility can enhance the strength-to-weight ratio of components, thus lowering carbon emissions while ensuring a safe service. Therefore, the current Special Issue aims to elucidate the state-of-the-art development of materials with high strength–ductility synergy from both fundamental and application perspectives. We welcome experimental, theoretical and simulation work on understanding the synergetic operation of deformation mechanisms, establishing structure-property connections, exploring new strategies for microstructure optimization, and developing new fabrication methods that allow for the production of materials with tailored microstructures.

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Message from the Editorial Board

Metallic materials play a vital role in the economic life of modern societies; contributions are sought on fresh developments that enhance our understanding of the fundamental aspects related to the relationships between processing, properties and microstructure – disciplines in the metallurgical field ranging from processing, mechanical behavior, phase transitions and microstructural evolution, nanostructures, as well as unique metallic properties – inspire general and scholarly interest among the scientific community.

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